Twelves Tips to Reduce Air Bubbles in Resin

by Scott Grove

Whether you're making a bar coating, river table, hybrid casting, small pen, wine stopper, handle blank, jewelry, coaster, or any inlay, bubbles can ruin a project. And eliminating them in any resin work is key to achieving crystal clear clarity.

The problem is, bubbles are a part of the process: mixing introduces air into the resin, so they can't be avoided. Trapped air bubbles, even tiny ones, make the resin look foggy or white, and large ones can get stuck in the thick resin and resist floating up and out. They can also create annoying voids that may appear during sanding or the tooling process, and then they need to be filled and re-tooled. They can stick in an inlay, look back at you and say, "Pop me if you can!"

I've had my fill of bubbles in resin, and I've tried everything to get rid of them, and now I'm sharing these Twelve Tips, used either by themselves or in combination, to help you obtain bubble-free resin work.

Many of the materials, tools and supplies used in this booklet can be found in the KIT, a resource page with direct links on ImagineWoodworking.com.

1. Pick the right resin.

This may sound obvious, but picking the right resin for the job is critical because each type of resin is formulated for a specific application. Some resins are designed for thin applications like counter tops, others are thick for castings; some (like urethanes) are sensitive to moisture that create even more bubbles, and others (like Cyanoacrylates) are sensitive to acids that will

prevent curing. Thick casting resins can take up to 30 days to fully cure; coating resins kick quickly, and if cast too thick, they can overheat, causing thermal runaway, and crack or yellow. So, know your resin before you start your project.

2. Seal the void.

I like to seal with ultra-thin GluBoost or Solarez UV cure grain sealer.

Most resins are exothermic, which means they create heat as they cure. If you're casting into a void of porous material like wood, this heat can expand air that is trapped within the pores, which creates air bubbles. So, the first step is to seal the void or edge that you are casting into or next to.

3. Seal the inlay.

Some inlay materials like wood strips, insects, paper, organic material, and more, are also porous, so the heat generated from the curing resin will expand the air inside this inlay material and create bubbles. It's the same concept noted in Tip #2. Seal porous inlay material, too.

4. Dry the inlay.

Some resins, like urethanes, are sensitive to moisture, so to avoid bubbles, your inlay material must be clean and completely dry, with zero percent moisture. Even bronze powder or key filings have surface moisture which can wreak havoc with urethane resins. Here are a few methods to try:

A. Weigh your inlay material, then place it in 100˚ F oven (I use a shop toaster). Check it every hour or so during the baking / drying process. When it stops losing weight, it is completely dry.
B. Or, simply keep it in the oven overnight before you use it. 12 hours is typically more than enough time to dry most inlay items out. Unless it is very wet like an organic rotten piece of wood. In this case, I would used the weighing technique.
C. Store your sensitive inlay material in an airtight container with desiccant packets. And, after you dry with an oven, store the remaining bits in a sealed container with desiccant too.
D. Make a rudimentary kiln from an old refrigerator or insulated box: add some holes at the top and bottom for air flow and put an incandescent light bulb inside. Store your materials inside to keep them dry and ready to use any time. This is good practice for storing small precious burls too.
E. Larger material can also be stored in a sealed room with a dehumidifier, which is another type of drying kiln.

5. Avoid trapped air.

Veneer sheet of Natural Paua shell

In some cases, air can be trapped under a sheet or veneer-type inlay, or a slab of wood like in river tables. Even fine particles like opal or key filings can trap air, especially when using thicker resins. These trapped air bubbles can eventually work their way out and up into the top layer of the resin or remain stuck and reveal themselves as a void after the resin is sanded or turned back.

To prevent these bubbles, mix aggregate inlay with low viscosity resin; seal the seams between each sheet and between the sheet and side of your void; or embed your inlay in resin when you place the inlay material.

6. Reduce viscosity.

A resin's viscosity is its tendency to resist change, shape, or flow: Viscosity is measured in centipoise (cps) See chart here: thin resin has a low viscosity ~260 cps; thick resin has highviscosity ~10,000 +. And so, by reducing a resin's viscosity and making it a bit thinner, it'seasier for bubbles to flow up and out. (But not necessarily pop—see Tip #8 for more on that.) Here are a few ways to decrease viscosity:

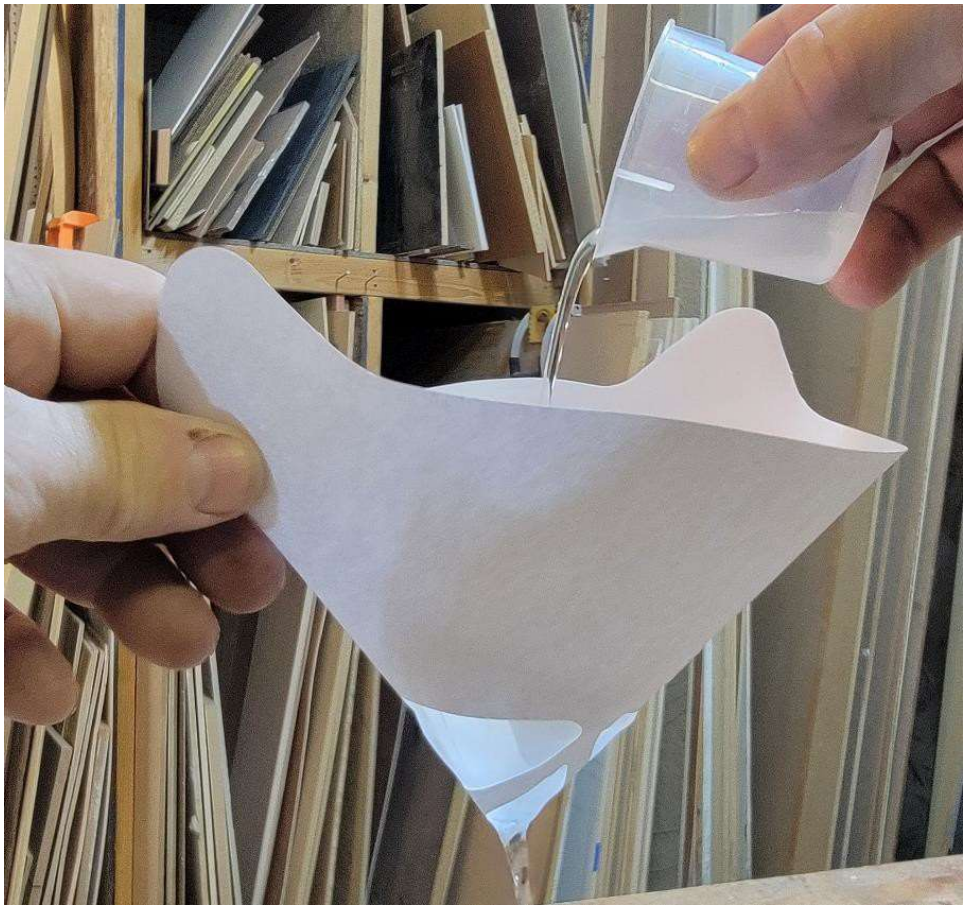
A. Pre-heat your resin: place your resin in a warm water bath in a double boiler. Keep in mind that heating most resins will also reduce the cure time. A general rule for epoxies is, for every 18˚F you raise the resin, you cut the cure time in half.
B. Thin your resin: Thinning the resin with a compatible solvent also reduces viscosity. For example, some epoxies can be thinned with up to 100% solvent. Caution: thinning resins can increase the shrinkage, and soften the final hardness and/or slow curing. Keep in mind that the volatility of the thinner is important too. For example, acetone flashes off fast which is good for quicker curing resins, but lacquer thinner is slow, which is better for slow curing resins because the lacquer thinner will remain in the resin, keeping the viscosity low, and giving bubbles time to release.

7. De-gas.

Drawing air bubbles out is one of the best ways to eliminate air in resin, but this takes some additional equipment that can vary in size and cost. In the industrial resin world and dentistry field, practitioners use a vacuum mixer, which is like a large kitchen mixer with a lid on the bowl that pulls a vacuum during the mixing process. These are expensive pieces of equipment but well worth it if you are in production. For smaller projects, you can use a vacuum chamber, with tips below:

A. A vacuum chamber is a great way to de-gas resin, and pull air bubbles out of any liquid, no matter how thick it is. It is very important to note that when working with a vacuum chamber, they should be rated and designed to take high vacuum loads. A cooking pot with a cover is NOT a good idea and can implode. Don't cheap out on buying the right vacuum chamber.
B. Vacuum pumps come in a variety of styles and sizes (rated in CFM; cubic feet per minute). The lower the CFM, the slower it will draw down the vacuum. For de-gassing resin, the higher the vacuum the better. 29" or more is best, but any vacuum is helpful.
C. There are many types of pumps like rotary vane, oil, diaphragm, and more, and each have pros and cons. One cautionary note is that oil-filled pumps are great for generating a high vacuum and you can find inexpensive ones online and at discount tool stores like Harbor Freight. These work fine but these styles emit a fine oil mist from their exhaust, which is not good to breathe or have all over your dining room furniture.
D. Vibrating liquids is a good way to release bubble, too, much like taping on the sides of a mold container, however, higher viscosity resins don't respond or release air bubbles with vibration. The bubble simply giggles with the resin and teases you, "This is fun, I'll just hang right here and wiggle with the resin."
E. For more information on vacuum chambers, watch Zach Higgin's YouTube video here: https://www.youtube.com/watch?v=RNzerafDx3c

8. The Pour.

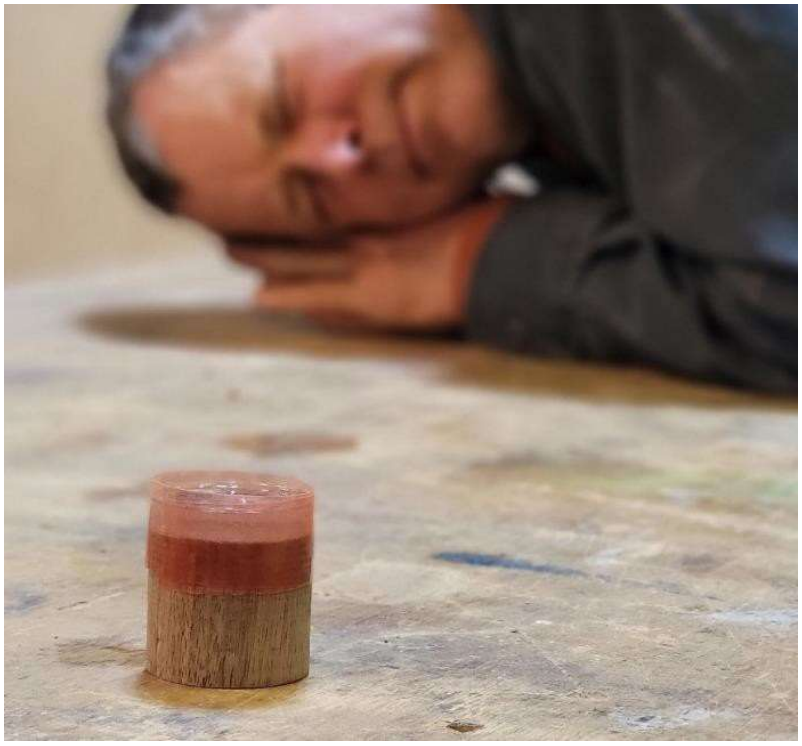


You can also introduce air bubbles by the way you pour resin into a mold or void, and if not poured correctly, the flowing resin can trap air in small voids or create them as the resin rolls over onto itself. Using a proper pouring technique can help remove unwanted bubbles and/or prevent them from occurring.

A. Single pour spot: It is best to pour into one spot of an inlay or mold and let the resin slowly flow around and into voids so air can escape. Drizzling resin all around like on an ice-cream Sunday is not a good idea and can create even more bubbles. For large inlay strips or runs, pour into various locations and let the resin flow into itself works, too. Again, don't drizzle back and forth, let the resin flow.
B. High pour: Pour from a higher distance and create a long, <u>thin</u> stream of resin to help pop bubbles trapped in the mix.

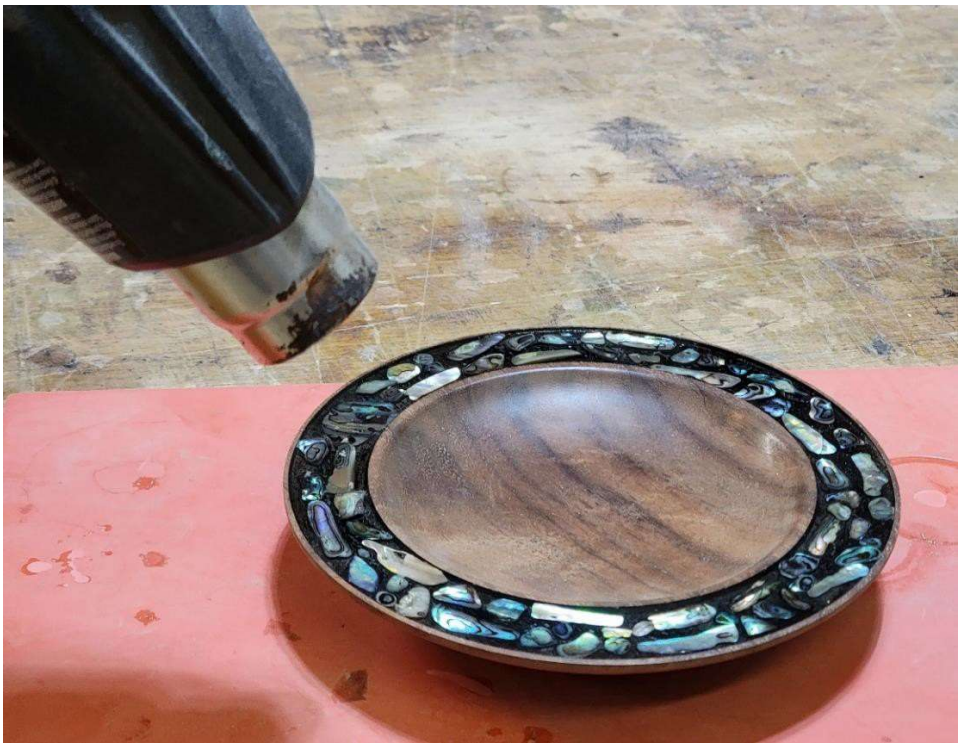
C. Filtered pour: Pouring resin through a paint filter also pops larger bubbles and traps any dust or bugs that may have landed in the resin during mixing. This can be done directly into a mold or void or into another cup that you then pour into the void.
D. Air or heat pop: Hit the pour stream with canned or compressed air to pop bubbles as they pass. A heat gun can also pop bubbles as resin is poured out of the cup. In either case, it is best to hit the bubbles right at the lip of the cup as it is poured.
E. Layers: Pour in layers and allow time for bubbles to float to the top and pop. You don't have to let each layer cure, just give it a bit of time for the bubbles to float and release. Using this step, in combination with the next two steps (#9 and #10) is good practice.

9. Let it rest.



Bubbles need time to float up and pop, and if you skip this step, they can be trapped. Some resins can be accelerated to cure right after a pour, like when using a curing oven or light with UV-cure resin, but don't rush for quick cure resin. It is important to let the resin rest so the bubbles can release before kicking the cure. Even "fast-curing" resins might not have time for air bubbles to migrate out, so just give them time.

10. Release surface tension.



Large Paua Abalone shell pieces add a nice accent to a bowl rim.

After a pour, bubbles may float to the surface but not pop, which leaves one annoying bump, or gives the surface a rough look. Most resins have surfactants that help release surface bubbles but they often need a little help to pop at the top. By simply releasing the surface tension of the resin, the bubbles will pop, leaving a smooth and glossy finish. Here are a few techniques to try:

A. Heat gun: A heat gun is my choice to pop stubborn surface bubbles. It also thins the resin by heating the surface as discussed in Tip #5. Heat guns or air is often used to move colored resins around to create different aesthetic effects, too, so be aware that might happen if you use a heat gun to pop bubbles, especially if you have pigmented resin. Also note: heat can cure the top layer of resin, possibly trapping solvents under it, which can inhibit a full cure.
B. Torch: Flame torches are often used with large epoxy floors or counters. They are cordless and easy to move around on large areas. Be very careful: a flame can ignite solvents in the resin like polyester or any thinners you may have added. This can be disastrous and cause a serious fire. They can also boil or burn the resin if over-heated. I prefer a heat gun over a flame torch.

C. Air: Compressed or canned air can also pop stubborn surface bubbles. Note that canned air can chill or freeze the surface, raising viscosity in the top layer of resin and prevent any future bubbles from migrating through.
D. Solvent: Misting a solvent onto the resin will reduce surface tension and break bubbles. When working with pigmented resin, solvents can also react with the pigments and create a dimpled or watery wave wash effect. On clear resin, they can affect the consistency of the glossy finish if left unpolished.

11. Over fill.

To avoid bubbles, you can overfill the void by creating a dam with silicone caulk, tape, or a taller mold box. This way, fine bubbles that didn't make it all the way to the top to pop are still higher than the finished surface and can be sanded or machined off. Obviously, this takes more resin, but it's a great trick for smaller casting or inlays.

12. Pressure cast.

Pressure casting is one of the best ways to ensure a visually clear, bubble-free casting. When resin is put under pressure, air bubbles in the resin are compressed down microscopically and are visually unperceivable. But here's a serious warning: do not use a household pressure cooker or a cheap unrated pressure pot. These can be very dangerous and you can create a bomb instead of a bubble-free casting.

I hope you find these tips useful. Please sign up for my newsletter and subscribe to my YouTube Channel for more tips, tricks, news, and notifications.

Happy Making!